This chapter was prepared by Jones & Stokes Associates, based on the results of the "Brookside Traffic Study" conducted by OMNI-MEANS, Ltd.

#### **EXISTING CONDITIONS**

#### Site Access

The proposed Brookside Community project site would be served by a network of state highways, arterials, and local streets. The project site is located just outside the southwestern Stockton City limit in San Joaquin County. The site is situated between Interstate Highway Route 5 (I-5) and Ten Mile Slough on the north and south sides of Brookside Road. Primary access to the project site will be made via an extension of March Lane west of Feather River Drive. Further access is to be provided by Brookside Road and a northern extension of Feather River Drive. Figure F-1 shows the major facilities of the roadway network in the project vicinity.

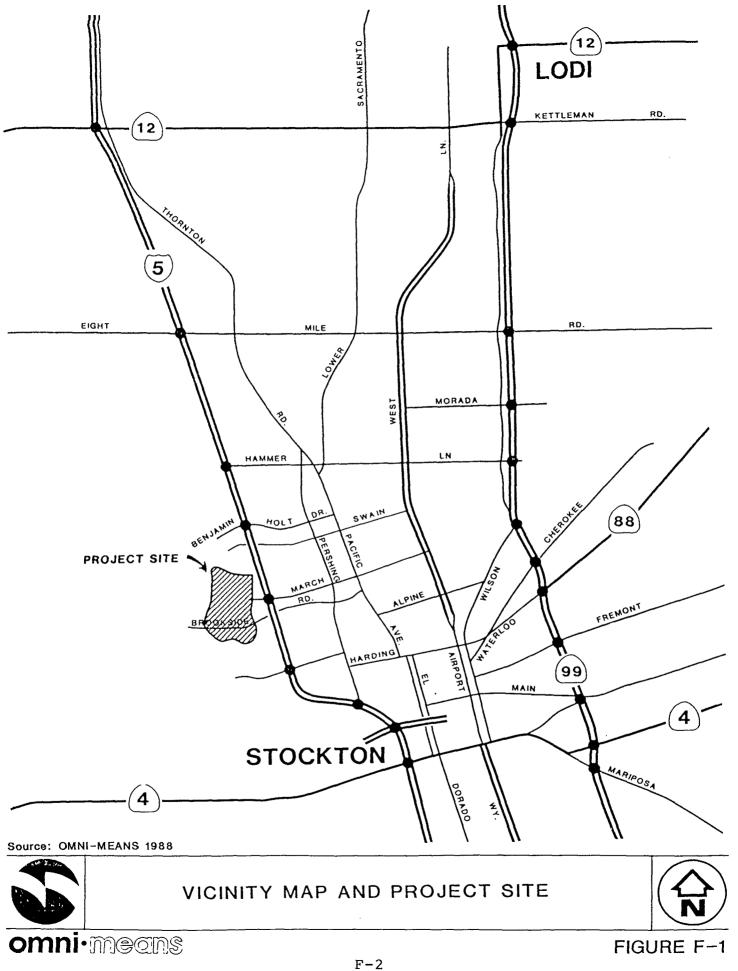
#### **Existing Street System**

Important roadways in the vicinity of the proposed project site include I-5, Pershing Avenue, Pacific Avenue, Benjamin Holt Drive, Quail Lakes Drive, March Lane, Brookside Road, and Feather River Drive. Frontage along these roads is dominated by residential and commercial uses. Each of these facilities is described below in more detail.

#### Interstate Highway Route 5

This major, regional facility is a north-south, six-lane, divided freeway in the project vicinity. Grade-separated, diamond-shaped interchanges are located along I-5 at Benjamin Holt Drive and March Lane. South of March Lane, I-5 is also an elevated roadway where it crosses the Calaveras River and the Mokelumne Aqueduct.

Interstate 5 carries a high volume of traffic daily, serving both regional and local travelers. Approximate average daily traffic (ADT) between Hammer Lane and Benjamin Holt Drive is 46,000 vehicles. The segment between Benjamin Holt Drive and March Lane carries about 56,000 vehicles daily. The I-5 overcrossing of the Calaveras River carries an average of 62,000 vehicles per day (California Department of Transportation 1981-1985).



#### Pershing Avenue

The southern end of Pershing Avenue forms a T-intersection at Fremont Street near the Stockton Deep Water Channel of the San Joaquin River. It extends north as a four-lane arterial to its terminus at Thornton Road. In the vicinity of the proposed project, frontage road land uses are dominated by high and low density residential uses. Pershing Avenue carries approximately 10,000-29,800 vehicles on a daily basis, and major intersections are signalized.

#### Pacific Avenue

Pacific Avenue is a major, north-south arterial that is an important part of the circulation network between the Downtown Central Business District and residential areas to the north. Pacific Avenue begins at Hammer Lane as a T-intersection and extends south to Harding Way where it becomes Madison Street. It is a six-lane arterial between Hammer Lane and March Lane, and a four-lane roadway south of March Lane. Traffic along Pacific Avenue is controlled by signals at all major intersections. The land uses fronting on this roadway are dominated by commercial uses in the project vicinity. Existing daily volumes on Pacific Avenue range from 21,200 to 37,300 vehicles.

#### Benjamin Holt Drive

This roadway is an east-west arterial located approximately midway between Hammer Lane and March Lane. Benjamin Holt Drive begins just east of I-5 as a continuation of Embarcadero Drive and extends east to Kermit Lane, just east of El Dorado Street; it is a four-lane street between Gettysburg Place and El Dorado Street. Daily traffic volumes on this roadway range from 10,000 to 18,000 vehicles.

#### Quail Lakes Drive

Quail Lakes Drive is a four-lane collector street, is divided by a two-way left turn lane, and serves the residential areas near Quail and Meadow Lakes. It begins at March Lane as an extension of Da Vinci Drive, extends north to Grizzly Hollow Way, and curves east to Pershing Avenue to become Robinhood Drive. Daily traffic on Quail Lakes Drive ranges from 11,500 to 15,000 vehicles.

#### March Lane

This four-lane, east-west arterial is a major connector between West Lane and I-5. Major intersections along March Lane are controlled by traffic signals. Land uses fronting on this roadway in the project vicinity are dominated by commercial uses. Existing daily traffic volumes on March Lane range between 9,400 and 40,200 vehicles.

#### Brookside Road

This two-lane roadway begins as a T-intersection at Pacific Avenue and extends west along the Calaveras River to the Buckley Cove Park Marina, west of the freeway. In the vicinity of the proposed project site, frontage along Brookside Road is dominated by agricultural and residential uses. Brookside Road carries approximately 2,100-5,600 vehicles per day.

#### Feather River Drive

Feather River Drive is a two-lane collector street that runs north-south and serves the residential areas west of I-5 and north of the Calaveras River. It begins at Brookside Road and extends north just past Driftwood Place.

#### **Existing Transit Service**

A comprehensive network of transit routes serves the entire City of Stockton from areas in the north near Bear Creek to areas located south of French Camp Slough. The system is operated by the Stockton Metropolitan Regional Transit District (SMART). Two routes serve the area in the immediate vicinity of the proposed project site. One route, which has a loading point at the intersection of Feather River Drive and March Lane, is a loop that covers the area along Benjamin Holt Drive, I-5, March Lane, and Pacific Avenue. The other route has a loading point at the Feather River Drive/Moss Creek Circle intersection. This route proceeds south to Brookside Road, zig-zags east to Holiday Drive, then zig-zags north to just past Hammer Lane. Both routes have common destinations near the north area shopping malls along Pacific Avenue (SMART 1986).

#### **Existing Traffic Conditions**

Quantification of current traffic operations is dependent on the existing number of lanes on roadways and intersection-approach configurations as well as on current daily traffic volumes and peak-hour turning movements. To assess existing traffic operating conditions in the vicinity of the proposed project, ADT counts were obtained from the City of Stockton, San Joaquin County, and Caltrans. These daily counts were supplemented by manual a.m. and p.m. peak-hour turning movement counts conducted by OMNI-MEANS, Ltd. for use in the North Stockton Cumulative Baseline Traffic Study. Additional a.m. and p.m. peak-hour turning movement counts were conducted at eight intersections to supplement the data collected for the North Stockton Cumulative Traffic Study. These locations include: northbound and southbound ramp terminals at 1-5 and Benjamin Holt Drive, and the intersections of Morgan Place/Swain Road, Herndon Place/Benjamin Holt Drive, Plymouth Road/Benjamin Holt Drive, Pershing Avenue/Swain Road, Feather River Drive/Driftwood Place, and McGaw Street/Brookside Existing a.m. and p.m. peak-hour turning movement volumes are presented in Figures F-2 and F-3, respectively.

FIGURE F-2

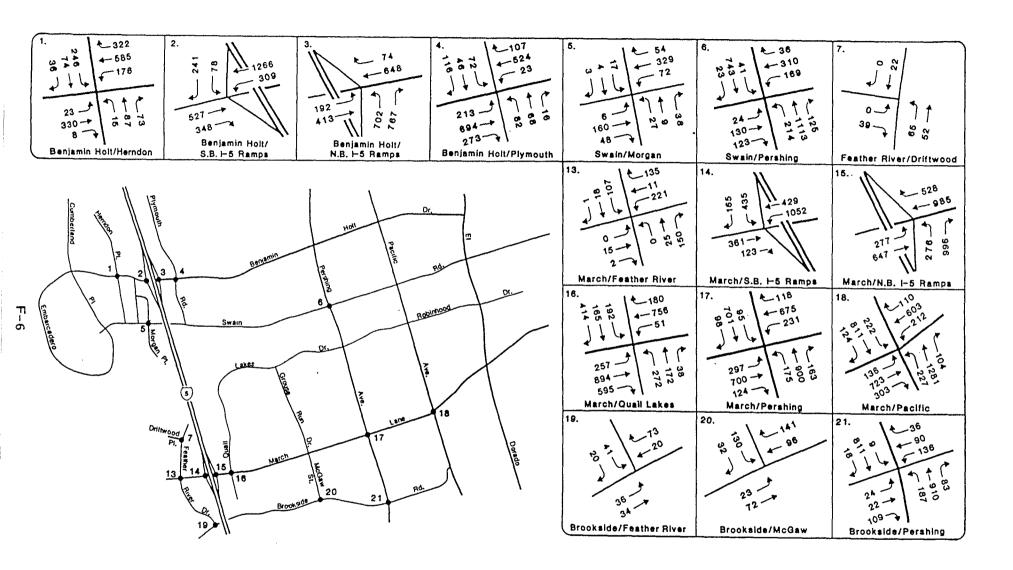
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EXISTING A.M. PEAK HOUR TURNING MOVEMENTS

Brookside/Pershing	Brookside/McGaw	Brookside/Feather River	1		\\ <b>4</b> 81	
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Feather River/Driftwood	Swain/Petshing	Swain/Morgan	Benjamin Holt/Plymouth	\toH nima(ne8 aqmaR 2-1 .8.И	\NoH nima(ne8 8.8. H 5 H .8.8	Benjamin Holl/Herndon
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Source: OMNI-MEANS 1988



Source: OMNI-MEANS 1988

FIGURE F-3



EXISTING P.M. PEAK HOUR TURNING MOVEMENTS



To provide a benchmark for assessment of impacts and identification of mitigation measures, Level-of-Service (LOS) evaluations were performed for key intersections and along roadway segments in the study area. LOS is a qualitative measure of traffic operating conditions whereby letter grades A through F are assigned to an intersection or roadway segment. The letter grades represent progressively congested traffic conditions, and are a function of roadway and/or intersection geometrics, volumes of traffic, turning movement conflicts, and signal phasing. The various characteristics associated with each LOS definition are presented in Table F-1.

#### Peak Hour Operations

Sixteen critical intersections were analyzed on a peak-hour basis under existing traffic conditions in the project vicinity. Table F-2 summarizes the existing a.m. and p.m. peak-hour LOS for the study area intersections with and without mitigation measures.

One of the locations analyzed is four-way-stop controlled, four are controlled by two-way stops, and the remaining 11 are controlled by traffic signals. By combining the peak-hour turning movement volumes with the existing geometrics, the volume/capacity (V/C) ratios were calculated for the signalized intersections. Reserve capacities were calculated for two-way-stop-controlled locations in order to establish the existing LOS.

To analyze unsignalized intersections, existing traffic volumes were first compared with peak-hour traffic signal-warrant volumes from the Manual of Uniform Traffic Control Devices (MUTCD) to identify those locations where traffic signals may already be necessary (U. S. Department of Transportation, Federal Highway Administration 1978). Based on existing peak-hour volumes, the four-way-stop-controlled intersection does meet peak-hour volume warrants for signalization. Following warrant analysis, unsignalized LOS evaluations were performed. At unsignalized locations, LOS is indicative of the magnitude of delay incurred by vehicles that must yield the right-of-way to other vehicles at the intersection. This includes vehicles on the stop-sign-controlled legs of the intersection, as well as left turns from the uncontrolled legs of the intersection. Since delay, based on reserve capacities, is the determining factor for LOS at unsignalized intersections, V/C ratios are not calculated.

The V/C ratios that are calculated for the four-way-stop-controlled intersections cannot be applied to Table F-1 to arrive at a corresponding LOS, since Table F-1 has been established for signalized intersection analysis. The LOS presented for the four-way-stop intersections are based on incremental ranges for each LOS derived from Tables F-3 and F-4.

Both the City of Stockton and San Joaquin County consider LOS D or better to be acceptable traffic conditions (Meissner pers. comm.). It should be noted that individual approaches to an intersection may occasionally experience a worse LOS than the overall LOS for the intersection. Both the overall LOS and the worst-movement LOS are reported for the critical intersections in Table F-2. In general, the overall LOS for an intersection was used to determine the significance of traffic congestion at any location. The exception to this rule would be the case where signal warrants are met for

Table F-1. Level of Service Definitions

Level of Service	Intersection	Hi ghway
"A"	Uncongested operations, all queues clear in a single-signal cycle.  V/C = 0.00 - 0.60*	Free flow vehicles unaffected by other vehicles in the traffic stream.
11B11	Uncongested operations, all queues clear in a single cycle. V/C - 0.61 = 0.70	Higher speed range of stable flow. Volume 50 percent of capacity or less.
uCu	Light congestion, occasional backups on critical approaches. V/C = 0.71 - 0.80	Stable flow with volumes not exceeding 75 percent capacity.
11D11	Significant congestion of critical approaches but intersection functional. Cars required to wait through more than one cycle during short peaks. No long queues formed. V/C = 0.81 - 0.90	Upper end of stable flow conditions. Volumes do not exceed 90 percent of capacity.
uEu	Severe congestion with some long- standing queues on critical approaches. Blockage of intersection may occur if traffic signal does not provide for protected turning movements. Traffic queue may block nearby intersection(s) upstream of critical approach(es). V/C = 0.91- 1.00	Unstable flow of roadway capacity. Operating speeds 30-25 mph or less.
uŁu	Total breakdown, stop-and-go operation. V/C greater than 1.00	Stop-and-go traffic with operating speeds of less than 30 mph.

<sup>\*</sup> V/C ratio same for highway description.

Table F-2. Intersection Levels of Service for Existing Conditions With and Without Mitigation

			Without Mit		With Mitigation				
	Intersection	V/C	LOS	V/C	LOS	V/C	LOS	V/C	LOS
<b>#</b> 1	Herndon Place/ Benjamin Holt Drive (M) <sup>a</sup>	0.69	С	0.90	E	0.69	В	0.72	с
#2	I-5 SB ramps/ Benjamin Holt Drive	0.35	A	0.47	A	None	required		
#3	I-5 NB ramps/ Benjamin Holt Drive	0.51	Α	0.61	В	None	required		
#4	Plymouth Road/ Benjamin Holt Drive	0.63	В	0.70	В	None	e required		
<b>#</b> 5	Morgan Place/ Swain Road (U)	n.a.	A/A	n.a.	A/C	None	required		
#6	Pershing Avenue/ Swain Road	0.94	E	0.79	С	0.74	С	0.69	В
<b>#</b> 7	Feather River Drive/ Driftwood Place (U)	n.a.	A/A	n.a.	A/A	None	required		
#8-12	Project intersections		Do no	t exist		None	required		
#13	Feather River Drive/ March Lane	0.34	Α	0.37	A	None	required		
#14	1-5 SB ramps/ March Lane	0.43	A	0.65	В	None	required		
<b>#</b> 15	I-5 NB ramps/ March Lane	0.48	Α	0.69	В	None	required		
<b>#</b> 16	Quail Lakes Drive/ March Lane	0.72	С	0.78	С	None	required		
#17	Pershing Avenue/ March Lane	0.66	В	0.92	E	0.64	В	0.86	D
#18	Pacific Avenue/ March Lane	0.69	В	0.91	E	0.69	В	0.89	D
#19	Feather River Drive/ Brookside Road (U)	n.a.	A/A	n.a.	A/A	None	e required		
<b>#</b> 20	McGaw Street/ Brookside Road (U)	n.a.	A/A	n.a.	A/A	None	e required		
#21	Pershing Avenue/ Brookside Avenue	0.56	A	0.62	В	None	e required		

#### Notes:

<sup>(</sup>M) = multifway-stop controlled.
(U) = two-way-stop controlled.
n.a. = not applicable.
-/- = overall LOS/worst-movement LOS.

 $<sup>^{\</sup>mathbf{a}}$  Meets peak-hour volume warrants for signalization based on MUTCD criteria.

Table F-3. Four-Way-Stop-Controlled Intersections: Approximate Capacity Service Volumes

Capacity* Service Volume, VPH Number of Lanes									
2 By 2	2 By 4	4 By 4							
1,900	2,800	3,600							
1,800	2,650	3,410							
1,700	2,500	3,220							
1,600	2,350	3,030							
1,500	2,200	2,840							
	1,900 1,800 1,700 1,600	Number of Lanes 2 By 2 2 By 4  1,900 2,800 1,800 2,650 1,700 2,500 1,600 2,350							

<sup>\*</sup> Total capacity, all legs.

Source: Herbert 1963.

Table F-4. Approximate Level of Service C Service Volumes for Four-Way-Stop-Controlled Intersections

	Le	evel C Service Volume, Number of Lanes	VPH
Demand Split	2 By 2	2 By 4	4 By 4
50/50	1,200	1,800	2,200
55/45	1,140	1,720	2,070
60/40	1,080	1,660	1,970
65/35	1,010	1,630	1,880
70/30	960	1,610	1,820

Source: Barton-Aschman Associates Inc. 1981

an unsignalized intersection, even if the existing overall LOS is D or better. In this case, traffic operating conditions would be considered unacceptable.

As shown in Table F-2, all but four of the study intersections operate at LOS C or better, reflecting traffic conditions where there are minimum or no delays.

The Herndon Place/Benjamin Holt Drive intersection currently operates at LOS C during the a.m. peak-hour and at unacceptable LOS E during the p.m. peak-hour. This multiway, stop-sign-controlled intersection presently meets peak-hour volume warrants for signalization based on MUTCD criteria.

Three signalized intersections experience unacceptable traffic operations under existing conditions. The Pershing Avenue/March Lane and Pacific Avenue/March Lane intersections also currently operate at unacceptable LOS E during the p.m. peak-hour. The Pershing Avenue/Swain Road location operates at LOS C during the p.m. peak-hour, but operates at LOS E during the a.m. peak-hour under existing conditions.

The LOS presented in Table F-2 for the intersection of I-5 northbound ramps and March Lane may be inconsistent with field observations at this location where queues have been observed to back up onto the freeway off-ramp during peak periods. Motorists making the northbound right turn from the off-ramp, with the eastbound left turn lane at Quail Lakes Drive as their destination, must drive through two through lanes in a short distance, creating an undesirable condition.

#### Daily Travel Demand

Existing daily volumes for 37 roadway segments and their corresponding LOS are presented in Table F-5. As shown in this table, the present street system adequately serves existing daily volumes, with the exception of segments along March Lane, which currently exceed 90 percent of theoretical capacity. Four roadway segments along Pershing Avenue and one section of roadway on Pacific Avenue currently operate at LOS D on a daily basis, which is indicative of roadways nearing capacity. The evaluation criteria used for daily LOS assessment are presented in Table F-6.

#### Freeway Ramp Volumes

Currently, traffic operations on the I-5 on- and off-ramps are satisfactory, with the exception of the southbound on-ramp at Benjamin Holt Drive. This location operates at LOS E during the a.m. peak-hour. All other freeway ramps in the project vicinity operate at LOS D or better during the peak periods (Table F-7). The LOS criteria used to evaluate freeway ramp operations are presented in Table F-8.

Table F-5. Existing Roadway Levels of Service

	Withou	With Mitigation			
Location	Daily Volume	LÖS	V/C	V/C	LOS
Interstate 5					
Hammer Ln. to Benjamin Holt Dr.	46,000	Α	0.38	None requir	eđ
Benjamin Holt Dr. to March Ln.	56,000	Α	0.47	None requir	ed
March Ln. to Del Rio Dr.	62,000	Α	0.52	None requir	
Del Rio Dr. to Country Club Blvd.	51,000	Ä	0.43	None requir	
Pacific Avenue					
Douglas Rd. to Porter Ave.	35,200	С	0.78	None requir	eď
Longview Ave. to Robinhood Dr.	37,300	Ď	0.83	None require	
Rivara Rd. to Edan Ave.	31,000	В	0.69	None requir	
Robinhood Dr. to Yokuts Ave.	33,300	Č	0.74	None require	
Yokuts Ave. to March Lane	30,200	В	0.67	None require	
Parching Avanua					
Pershing Avenue Meadow Ave. to Lincoln Rd.	16,300	A	0.54	None requir	ed
Cameron Way to Benjamin Holt Dr.	16,500	A	0.37	None require	ed
Douglas Rd. to Swain Rd.	22,400	С	0.75	None requir	
Venetian Dr. to Burke Bradley Rd.	25,000	D	0.83	None requir	
Rosemarie Ln. to El Monte St.	26,700	Ď	0.89	None requir	
Rosemarie Ln. to March Ln.	25,100	Ď	0.84	None require	
	23,100	2	V.U-T	none requir	
Benjamin Holt Drive Gunton Way to Alturas Ave.	9,600	A	0.32	None requir	nd
Herndon PI. to Grigsby PI.	18,400	B	0.52	None require	
	•			•	
Plymouth Rd. to Belmont Pl.	17,800	Ą	0.59	None require	
Vicksburg Pl. to Gettysburg Pl.	13,500	Ą	0.45	None requir	
Harrisburg to Leesburg	15,300	A	0.51	None requir	ed
March Lane					_
Feather River Dr. to 1-5	9,400	A	0.31	None requir	
I-5 to Quail Lakes Dr.	40,200	F	1.34	0.89	D
Quail Lakes Dr. to Grouse Run Dr.	27,600	Е	0.92	0.61	В
Grouse Run Dr. to Pershing Ave.	27,400	E	0.91	0.61	В
Pershing Ave. to Pacific Ave.	26,400	D	0.88	None requir	ed
Pacific Ave. to Claremont Ave.	24,500	D	0.82	None requir	ed
Claremont Ave. to El Dorado St.	21,400	С	0.71	None requir	ed
Swain Road					
Morgan Pl. to Plymouth Rd.	5,700	A	0.38	None requir	ed
Exit St. to Pershing Ave.	8,200	Ä	0.55	None requir	
Pershing Ave. to Pacific Ave.	8,100	Â	0.54	None requir	
Pacific Ave. to El Dorado St.	7,100	Ä	0.47	None requir	
Quail Lakes Drive					
Fox Sparrow Ct. to Sandpiper Ct.	15,000	Α	0.50	None requir	ed
Mallard Creek Cir. to Round Valley	11,400	Â	0.38	None requir	
Brookside Road					
City limits to Feather River Dr.	2,400	Α	0.16	None requir	ad
		Â	0.15		
Michaelangelo Dr. to McGaw St.	2,200	Â	0.15	None requir	
McGaw St. to Pershing Avenue	5,600			None requir	
Pershing Ave. to Pacific Ave.	5,100	Α	0.34	None requir	ea

Table F-6. Evaluation Criteria for Level of Service

Facility Type         C ADT Traffic Volumes         D ADT Traffic Volumes         E/F ADT Traffic Volumes           Urban Streets         V/C = 0.71-0.80         V/C = 0.81-0.90         V/C = 0.91-1.00           Two lane         10,700-12,000         12,000-13,500         13,500-15,000           Four lane         21,300-24,000         24,000-27,000         27,000-30,000           Six lane         32,000-36,000         36,000-40,500         40,500-45,000           Eight lane         42,600-48,000         48,000-54,000         54,000-60,000           Freeway         V/C = 0.55-0.77         V/C = 0.78-0.93         V/C - 0.94-1.00           Four lane         44,000-62,000         62,000-74,000         76,000-80,000           Six lane         66,000-94,000         94,000-112,000         114,000-120,000           Eight lane         88,000-125,000         125,000-149,000         152,000-160,000           Ten lane         110,000-156,000         156,000-186,000         186,000-200,000				
Two lane 10,700-12,000 12,000-13,500 13,500-15,000  Four lane 21,300-24,000 24,000-27,000 27,000-30,000  Six lane 32,000-36,000 36,000-40,500 40,500-45,000  Eight lane 42,600-48,000 48,000-54,000 54,000-60,000  Freeway V/C = 0.55-0.77 V/C = 0.78-0.93 V/C - 0.94-1.00  Four lane 44,000-62,000 62,000-74,000 76,000-80,000  Six lane 66,000-94,000 94,000-112,000 114,000-120,000  Eight lane 88,000-125,000 125,000-149,000 152,000-160,000  Ten lane 110,000-156,000 156,000-186,000 186,000-200,000	Facility Type	C ADT Traffic	D ADT Traffic	Level of Service E/F ADT Traffic Volumes
Four lane 21,300-24,000 24,000-27,000 27,000-30,000 Six lane 32,000-36,000 36,000-40,500 40,500-45,000 Eight lane 42,600-48,000 48,000-54,000 54,000-60,000 $V/C = 0.55-0.77$ $V/C = 0.78-0.93$ $V/C - 0.94-1.06$ Four lane 44,000-62,000 62,000-74,000 76,000-80,000 Six lane 66,000-94,000 94,000-112,000 114,000-120,000 Eight lane 88,000-125,000 125,000-149,000 152,000-160,000 Ten lane 110,000-156,000 156,000-186,000 186,000-200,000	Urban Streets	V/C = 0.71-0.80	V/C = 0.81-0.90	V/C = 0.91-1.00
Six lane $32,000-36,000$ $36,000-40,500$ $40,500-45,000$ Eight lane $42,600-48,000$ $48,000-54,000$ $54,000-60,000$ $76,000-60,000$ $76,000-60,000$ Four lane $44,000-62,000$ $62,000-74,000$ $76,000-80,000$ Six lane $66,000-94,000$ $94,000-112,000$ $114,000-120,000$ Eight lane $88,000-125,000$ $125,000-149,000$ $152,000-160,000$ Ten lane $110,000-156,000$ $156,000-186,000$ $186,000-200,000$	Two lane	10,700-12,000	12,000-13,500	13,500-15,000
Eight lane $42,600-48,000$ $48,000-54,000$ $54,000-60,000$ $V/C = 0.55-0.77$ $V/C = 0.78-0.93$ $V/C - 0.94-1.00$ Four lane $44,000-62,000$ $62,000-74,000$ $76,000-80,000$ Six lane $66,000-94,000$ $94,000-112,000$ $114,000-120,000$ Eight lane $88,000-125,000$ $125,000-149,000$ $152,000-160,000$ Ten lane $110,000-156,000$ $156,000-186,000$ $186,000-200,000$	Four lane	21,300-24,000	24,000-27,000	27,000-30,000
Freeway $V/C = 0.55-0.77$ $V/C = 0.78-0.93$ $V/C - 0.94-1.06$ Four lane $44,000-62,000$ $62,000-74,000$ $76,000-80,000$ Six lane $66,000-94,000$ $94,000-112,000$ $114,000-120,000$ Eight lane $88,000-125,000$ $125,000-149,000$ $152,000-160,000$ Ten lane $110,000-156,000$ $156,000-186,000$ $186,000-200,000$	Six lane	32,000-36,000	36,000-40,500	40,500-45,000
Four lane 44,000-62,000 62,000-74,000 76,000-80,000  Six lane 66,000-94,000 94,000-112,000 114,000-120,000  Eight lane 88,000-125,000 125,000-149,000 152,000-160,000  Ten lane 110,000-156,000 156,000-186,000 186,000-200,000	Eight lane	42,600-48,000	48,000-54,000	54,000-60,000
Four lane 44,000-62,000 62,000-74,000 76,000-80,000  Six lane 66,000-94,000 94,000-112,000 114,000-120,000  Eight lane 88,000-125,000 125,000-149,000 152,000-160,000  Ten lane 110,000-156,000 156,000-186,000 186,000-200,000				
Six lane       66,000-94,000       94,000-112,000       114,000-120,000         Eight lane       88,000-125,000       125,000-149,000       152,000-160,000         Ten lane       110,000-156,000       156,000-186,000       186,000-200,000	Freeway	V/C = 0.55-0.77	V/C = 0.78-0.93	V/C - 0.94-1.00
Eight lane 88,000-125,000 125,000-149,000 152,000-160,000 Ten lane 110,000-156,000 156,000-186,000 186,000-200,000	Four lane	44,000-62,000	62,000-74,000	76,000-80,000
Ten lane 110,000-156,000 156,000-186,000 186,000-200,000	Six lane	66,000-94,000	94,000-112,000	114,000-120,000
	Eight lane	88,000-125,000	125,000-149,000	152,000-160,000
Twelve lane 132,000-187,000 187,000-223,000 223,000-240,000	Ten lane	110,000-156,000	156,000-186,000	186,000-200,000
	Twelve lane	132,000-187,000	187,000-223,000	223,000-240,000

Source: Transportation Research Board 1965 and 1980.

Table F-7. Existing I-5 Ramp Levels of Service

		Without Mitigation									
	Peak Hou	ur Volumes	L(	OS	LOS						
Location	AM	PM	AM	PM	AM PM						
Benjamin Holt Drive:											
Southbound Off	167	319	В	В	None required						
Southbound On	1,529	657	E	В	D . A						
Northbound Off	581	1,469	В	D	None required						
Northbound On	186	266	Α	Α	None required						
March Lane:											
Southbound Off	1,040	600	С	C C	None required						
Southbound On	737	1,175	C C C	С	None required						
Northbound Off	992	1,272	С	D C	None required						
Northbound On	342	805	Α	С	None required						
Ryde/Plymouth:											
Southbound Off	443	575	С	C C	None required						
Northbound On	480	642	В	С	None required						

Table F-8. Level of Service Criteria for Checkpoint Flow Rates at Ramp-Freeway Terminals

Level of Service	On-Ramp Merge Flow Rate (PCPH) <sup>a</sup> V <sub>m</sub> (less than or equal to)	Off-Ramp Diverge Flow Rate (PCPH) <sup>b</sup> V d (less than or equal to)				
A	600	650				
В	1,000	1,050				
С	1,450	1,500				
D	1,750	1,800				
E	2,000	2,000				

Note: PCPH = passenger cars per hour

Source: Transportation Research Board 1985.

a Lane-1 flow rate plus ramp flow rate for one-lane, right-side on-ramps.

b Lane-1 flow rate immediately upstream of off-ramp for one-lane, right-side ramps.

#### PROJECTED IMPACTS

#### Future Land Development Conditions Analyzed

To provide a thorough understanding of the potential impacts on traffic operations associated with development of the proposed Brookside Community development, two future land development scenarios were evaluated. These two conditions are defined below.

#### **Existing Plus Approved Development**

This condition assumes the existing environment with projects that have already been approved for construction by the City of Stockton but are as yet unbuilt. This condition is a modification of "existing conditions" described above. The addition of approved projects to the existing environmental condition provides a more realistic baseline for comparing the traffic impacts of the project.

#### **Cumulative Development**

This future base assumes existing and already approved development plus development on all remaining vacant land within the City limits. The assumptions on these vacant lands were based on current land use trends in the City. This cumulative baseline scenario also includes development of the six specific projects that have been proposed, but not approved, for annexation by the City. These six specific projects include: Spanos Park, Harbor Cove, Morada Property, Christian Life Center, Stockton Auto Expansion, and Brookside.

A more comprehensive future base scenario, including full buildout of the entire study area, was analyzed in the "North Stockton Cumulative Base-line Traffic Study" (OMNI-MEANS, Ltd. 1987). This document is hereby incorporated by reference.

The two future land development bases were evaluated both with and without the proposed project, resulting in the four future land use alternatives listed below.

- 1. Existing Plus Approved Development without the Brookside project.
- 2. Existing Plus Approved Development with the Brookside project.
- 3. Cumulative Development without the Brookside project.
- 4. Cumulative Development with the Brookside project.

In addition, each scenario was analyzed and mitigation recommended where appropriate.

#### Future Roadway Network

The existing street network was assumed for the Existing Plus Approved Development without the Brookside land development condition. For the Existing Plus Approved Development with the Brookside condition, the following roadway additions were made.

- o A western extension of March Lane, beginning west of Feather River Drive, turning southerly, then joining an alignment with the existing Brookside Road and terminating at the Buckley Cove Marina.
- o A northern extension of Feather River Drive to Morgan Place, including construction of a bridge across Fourteen Mile Slough.
- o A southern access to Brookside Road.

As depicted in the Brookside site plan (Figure 3 of the Project Description), there is a proposed roadway which will align with the existing Brookside Road facility. This southern access was incorporated into all "with Brookside" analysis conditions.

For the cumulative scenarios, the future network used is consistent with the City of Stockton's "Proposed Master Plan of Streets and Highways," and included the improvements listed above (Stockton, City of 1985). One exception to the plan was the exclusion of the proposed Western Beltway, which was projected to carry only small traffic volumes that would not warrant construction of the facility.

In addition, five internal project intersections were added to the analysis. The project site intersections were analyzed assuming single-lane approaches and stop sign control on minor streets.

#### Methodology

For the impact analysis, computer-based travel demand forecasting models developed for the North Stockton Cumulative Baseline Traffic Study were used to determine the potential traffic impacts associated with the Brookside development on streets and at intersections in the vicinity of the project site. The models, one each for the a.m. peak-hour, the p.m. peak-hour and daily traffic, perform the traditional travel demand forecasting procedures: trip generation, trip distribution, and traffic assignment, for each of the land use conditions. Because the models are computer-based, a relatively quick analysis of various large-scale, citywide land use and street network alternatives is possible.

The models developed use a proprietary software package known as MINUTP. MINUTP can be thought of as a framework of transportation modeling modules that is custom-fit to a specific study area. The information required to operate the model includes detailed inventories of existing land development, street facilities, existing traffic flows and counts, and regional travel patterns and behavior. These elements are integrated into the model framework, along with specific travel parameters that are developed to produce an accurate simulation of existing traffic flows in the study area.

Once existing traffic conditions are simulated by the model, it is considered valid for forecasting future traffic conditions.

#### Trip Generation

Traffic generation has been estimated for the Brookside development using data published by the Institute of Transportation Engineers (ITE), the Transportation Research Board, and the City of Stockton Traffic Signal Fee Ordinance (ITE 1983, Transportation Research Board 1983, and Stockton, City of 1987). The trip rates were adjusted to more accurately reflect the observed traffic volumes that currently exist on the street system. This is appropriate since the number of trips generated by a particular land use is dependent upon the land uses in the vicinity of the trip generator, the composition of land uses throughout the City, and the population of the entire metropolitan area. The trip generation rates used in this study are shown in Table F-9. The traffic generation estimates for the proposed project land uses are given in Table F-10.

#### Trip Distribution and Assignment

Three components of trip distribution and assignment were estimated for use in the transportation model. The first component is a measure of the internal and external distribution of project traffic. The internal trips generated by the project are defined as those trips that have both origin and destination within the study area. External trips are those trips which have either the origin or destinations outside the study area. Factors that affect the internal/external trip components of a study area include the mixture of land uses, the size of the study area, trip purposes, and the proximity of the study area to other land use activities.

The second component of trip distribution that has to be estimated is the directional distribution of externally oriented traffic to and from the study area.

The third component estimated for the distribution and assignment of traffic was the amount of through traffic on the study area streets. Through traffic consists of trips that pass through the study area without stopping. Since these trips are not quantified in the trip generation phase of the travel demand forecasting, they must be estimated separately.

The completed and validated transportation models were used to project and assign daily a.m. and p.m. traffic to each of the alternative street networks with their respective land development scenarios. Much of the project traffic has either origins or destinations to the east and south toward the primary population and employment centers of the Stockton Metropolitan Region. The following sections discuss the specific transportation impacts of each of these scenarios and the necessary improvements to mitigate any adverse impacts.

Table F-9. Trip Generation Rates

			AM		PM			
Land Use	Daily Rate	In	Out	Total	In	Out	Total	
Residential								
Single family	9.1/du	0.20	0.53	0.73	0.63	0.37	1.00	
Two-family duplex	7.0/du	0.11	0.45	0.56	0.51	0.25	0.76	
Three family	6.5/du	0.11	0.41	0.52	0.48	0.24	0.72	
Multifamily	6.0/du	0.10	0.40	0.50	0.47	0.23	0.70	
Planned unit development	7.8/du	0.12	0.58	0.70	0.50	0.30	0.80	
Retirement home	3.3/du	0.27	0.13	0.40	0.16	0.24	0.40	
Nonresidential								
General office	15.0/1,000 sf	1.81	0.32	2.13	0.33	2.06	2.39	
Light industrial	5.2/1,000 sf	0.57	0.10	0.67	0.31	0.94	1.25	
Heavy industrial	1.7/1,000 sf	0.19	0.03	0.22	0.11	0.32	0.43	
Commercial	50.0/1,000 sf	0.81	0.74	1.55	1.52	1.71	3.23	
CBD commercial	27.0/1,000 sf	0.43	0.39	0.83	0.83	0.93	1.76	
Elementary and junior high school	17.3/1,000 sf	3.63	1.80	5.43	0.11	0.23	0.34	
Senior high school and college	17.6/1,000 sf	1.83	0.11	1.94	0.44	0.88	0.32	
Hospitals	16.9/1,000 sf	1.06	0.41	1.47	0.62	1.09	1.71	

Table F-10. Proposed Project Trip Generation

		Daily	A	M Peak Tr	ips	!	PM Peak T	rips			
Land Use	Quantity	Trips	ln	Out	Total	In	Out	Total			
Single family	2,267 du	20,630	454	1,201	1,655	1,428	839	2,267			
PURD	209 du	1,630	25	121	146	105	62	167			
Multifamily	1,035 du	6,210	104	414	518	487	238	725			
Office/professional	52.5 ac	11,820	1,426	252	1,678	260	1,623	1,883			
Commercial	4.1 ac	3,000	49	44	93	91	103	194			
Parks	15.2 ac	71.0	1	2	3	3	3	6			
Lakes	47.6 ac										
Recreational center	3.8 ac	125	2	3	5	5	5	10			
Schools	65.5 ac	2,342	342	106	448	41	83	124			
Brookside Farm	54.8 ac										
Golf course	247.8 ac	1,191	38	9	47	10	80	90			
Totals		47,019	2,441	2,152	4,593	2,430	3,036	5,466			

PURD = Planned Unit Residential Development

du = dwelling units

ac = acres

#### Criteria for Identifying Impacts

As discussed earlier in the "Existing Conditions" section, LOS A, B, C, and D are considered acceptable. Traffic volumes that result in LOS E or F were considered significant adverse impacts.

Intersections that meet peak-hour volume warrants for signalization under future land use alternatives have also been identified as incurring significant impacts.

Mitigation measures were identified where significant adverse impacts were projected. It was assumed for this analysis that the maximum allowable roadway width would include eight travel lanes. An intersection approach would include a maximum of four through lanes, two left-turn lanes, and one exclusive right-turn lane.

#### Project Impacts and Mitigation Measures

## Impact: Increased Traffic on Already Congested Transportation Facilities Under Existing Conditions

Peak-Hour Intersection Analysis. The project would add traffic to the following already congested intersections, resulting in LOS E.

- o Herndon Place/Benjamin Holt Drive
- o Pershing Avenue/Swain Road
- o Pershing Avenue/March Lane
- o Pacific Avenue/March Lane

This is considered a significant adverse impact.

#### Mitigation Measures

The following intersection improvements would reduce the impact to a less-than-significant level.

- o Herndon Place/Benjamin Holt Drive The City should install a two-phase signal.
- o Pershing Avenue/Swain Road The City should convert the shared through/right-turn lane to a through only lane and add an exclusive right-turn lane to the eastbound approach to the intersection.
- o Pershing Avenue/March Lane The City should add an exclusive right-turn lane on the northbound and southbound approaches to the intersection.

o Pacific Avenue/March Lane - The City should add an exclusive right-turn lane to the northbound approach to the intersection.

Daily Critical Roadway Segment Analysis. The project would add traffic to the following already congested roadway segments.

o March Lane from I-5 to Quail Lakes Drive, from Quail Lakes Drive to Grouse Run Drive, and from Grouse Run Drive to Pershing Avenue.

This is considered a significant adverse impact.

#### Mitigation Measures

The following roadway improvements would reduce the impact to a less-than-significant level.

o The City should widen March Lane to six lanes from I-5 to Pershing Avenue.

Peak-Hour Freeway Ramp Analysis. The project would add traffic to the Southbound I-5 on-ramp at Benjamin Holt Drive, which is already congested. This is considered a significant adverse impact.

Mitigation Measures Caltrans should provide a two-lane on-ramp and a two-lane merge at this location. These improvements would reduce the impact to a less-than-significant level.

## Impact: Deterioration of Traffic Conditions Under Existing Plus Approved Development Scenarios

<u>Peak-Hour Intersection Analysis</u>. The a.m. and p.m. peak-hour traffic volumes estimated for the Existing Plus Approved Development land use conditions are shown in Figures F-4 and F-5. The resulting levels of service for the critical intersections under these conditions are presented with and without mitigation in Table F-11.

Under the Existing Plus Approved Development without Brookside alternative, the following four intersections would operate at LOS E or F during either the a.m. or p.m. peak-hour.

- o Herndon Place/Benjamin Holt Drive
- o Pershing Avenue/Swain Road
- o Pershing Avenue/March Lane
- o Pacific Avenue/March Lane

This is considered a significant adverse impact.

#### Mitigation Measures

Successors in interest should pay a pro rata share of the costs of the following capital improvements as determined by the City.

Table F-11. Intersection Levels of Service for the Existing Plus Approved Development Conditions With and Without Mitigation

			Exi	sting Plus	Approved	Development	t without	Brookside	<del> </del>		Existi	ng Plus Apr	roved Dev	elopment	With Broo	kside	
				Mitigation				litigation				Mitigation				tigation	
	Intersection	V/C AI	LOS	-V/C	LOS	V/C	LOS	- V/C P	LOS	V/C	LOS	- <del>V/C F</del>	LOS	V/C	LOS	V/C	PM LOS
#1	Herndon Place/ Benjamin Holt Drive <sup>a</sup>	0.69	с	0.90	E	0.67	В	0.77	С	0.71	С	0.91	E	0.68	В	0.78	С
#2	i-5 SB Ramps/ Benjamin Holt Drive	0.71	С	0.48	٨		None r	equired		0.77	С	0.52	A		None re	equired	
#3	i-5 NB Ramps/ Benjamin Holt Driwe	0.44	٨	0.67	В		None r	equired		0.51	A	0.72	С		None re	ben tupe	
#4	Plymouth Road/ Benjamin Holt Drive	0.69	В	0.79	С		None r	equi red		0.75	С	0.86	D		None r	quired	
<b>#</b> 5	Morgan Place/ Swain Road	n.a.	A/A	n.a.	A/C		None r	equired		n.a.	· C/D	n.a.	D/E	0.48	8	0.72	c
#6	Pershing Avenue/ Swain Road	0.94	E	0.79	С	0.74	С	0.70	В	1.01	F	0.88	D	0.80	С	0.88	D
#7	Feather River Drive/ Driftwood Place	n.a.	A/A	n.a.	A/A		None r	equired		n.a.	B/C	n.a.	B/E		None re	equired	
#8	East Brookside Road/ Driftwood Place	Doe	s not exi	st			None r	equired		n.a.	A/C	n.a.	C/D		None re	equired	
<b>#</b> 9	West Brookside Road/ March Lane	Doe	s not exf	st			None r	equi red		n.a.	A/B	n.a.	A/A		None re	equired	
#10	Club House/March Lane	Doe	s not exi	st			None r	equired		n.a.	A/B	n.a.	A/A		None re	equi red	
#11	Brookside Road/Harch Lane	Doe	s not exi	st			None r	equired		n.a.	D/E	n.a.	D/E	0.86	D	0.78	С
#12	Brookside Road/South Loop	Doe	s not exi	st			None r	equired		n.a.	A/C	n.a.	B/D		None re	equired	
#13	Feather River Drive/ March Lane	0.34	٨	0.38	A		None r	equired		1.03	F	1.44	F	0.72	С	0.79	c
#14	I-5 SB ramps/ March Lane	0.86	Д	0.78	В		None r	equired		1.16	F	1.00	E	0.54	A	0.84	ם
#15	I-5 NB ramps/ March Lane	0.49	A	0.78	С		None r	equired		1.15	F	1.42	F	0.76	С	0.80	c
<b>#</b> 16	Quail Lakes Drive/ March Lane	0.70	С	0.82	D		None r	equi red		0.88	D	1.04	F	0.67	В	0.90	D
#17	Pershing Avenue/ March Lane	0.72	c	0.98	E	0.67	В	0.88	D	0.81	D	1.20	F	0.70	В	0.86	D
#18	Pacific Avenue/ March Lane	0.89	D	1.04	F	0,75	С	0.85	D	0.85	D	1.11	F	0.76	С	0.88	D
#19	Feather River Drive/ Brookside Road	n.a.	A/A	n.a.	A/A		None r	equired		n.a.	B/E	n.a.	B/E	0.63	В	0.80	D
<b>#</b> 20	McGaw Street/ Brookside Road	n.a.	A/A	n.a.	A/B		None r	equired		n.a.	C/D	n.a.	D/E		None re	quired	
#21	Pershing Avenue/ Brookside Road	0.60	٨	0.68	В		None r	equired		0.79	С	0.94	Ε	0.67	С	0.82	D

Notes:

n.a. = not applicable.

<sup>-/- =</sup> overall LOS/worst-movement LOS.

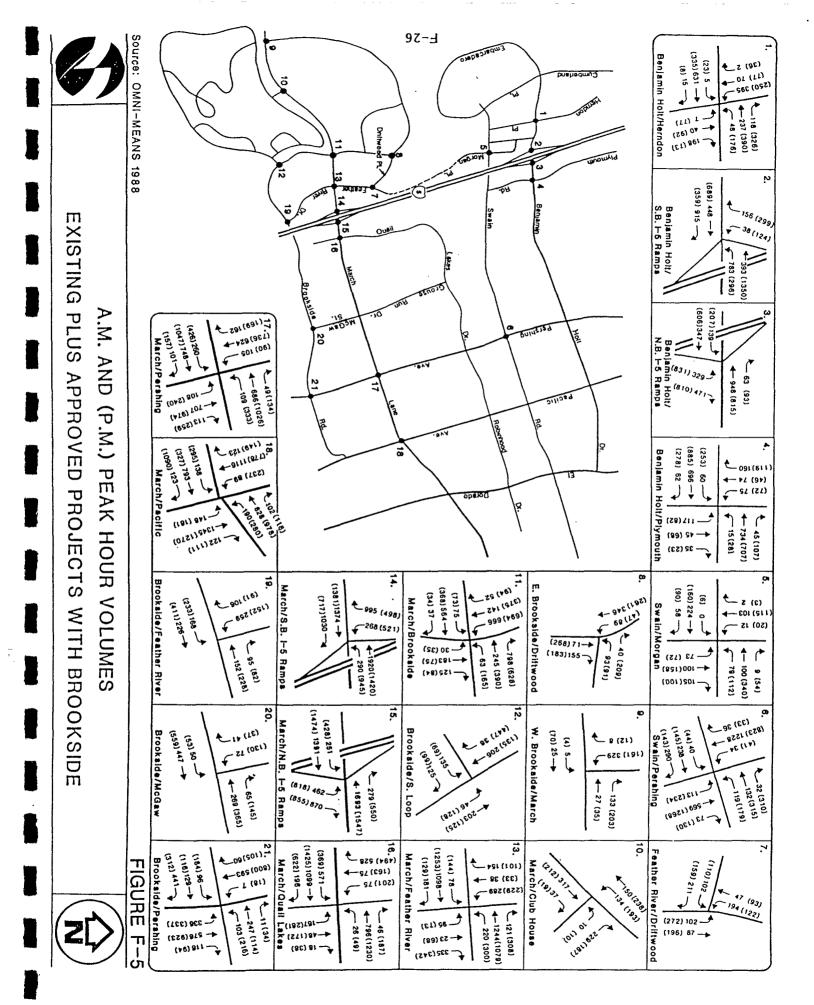
Meets peak-hour volume warrants for signalization based on MUTCD criteria.

(0) 0 (0) (29) (20) (20) (20) (20) (20) (20) (20) (20	Macch/N B. 1-5 (128) 98 (1093) 911 (1093) 912 (1093) 913 (1093) 91
(173) 1136 (1743) 1136 (1744)	2 6 \ 2 6 \ \ 2 (199)
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(213) 60 (21) (21) (21) (21) (21) (21) (21) (21)	Dorado  Dorado  Para do la companya de la companya
3. (197) 130 (198) (197) 130 (197) 1	Pacilic Ave. 17
2. (265)   124 (262)   124 (26	CLOUSE STATE OF THE PROPERTY O
(320) 817 (136) 198 (137)	Plymouth Rd Co Morgan.  Morgan.  Pl. Morgan.  Cumberland  Embarcadeto

FIGURE F-4

A.M. AND (P.M.) PEAK HOUR VOLUMES EXISTING PLUS APPROVED PROJECTS WITHOUT BROOKSIDE Source: OMNI-MEANS 1988





- o Herndon Place/Benjamin Holt Drive The City should install a signal at this intersection.
- o Pershing Avenue/Swain Road The City should add an exclusive right-turn lane to the eastbound approach to this intersection.
- o Pershing Avenue/March Lane The City should add a right-turn lane to the northbound approach and a left-turn lane to the east-bound approach to this intersection.
- o Pacific Avenue/March Lane The City should add a left-turn lane to southbound and westbound approaches to this intersection.

The above listed mitigation measures would reduce the impact to a less-than-significant level.

Under the Existing Plus Approved Development with the proposed project, 10 critical intersections would experience LOS E or F during the a.m. or p.m. peak-hour, and two unsignalized intersections would require improvement. The following intersections would be impacted.

- o Herndon Place/Benjamin Holt Drive
- o Morgan Place/Swain Road
- o Pershing Avenue/Swain Road
- o Brookside Road/March Lane
- o Feather River Drive/March Lane
- o I-5 Southbound Ramps/March Lane
- o I-5 Northbound Ramps/March Lane
- o Quail Lakes Drive/March Lane
- o Pershing Avenue/March Lane
- o Pacific Avenue/March Lane
- o Feather River Drive/Brookside Road
- o Pershing Avenue/Brookside Road

This is considered a significant adverse impact.

#### Mitigation Measures

The applicant and successors in interest should be required to pay a pro rata share of the costs of the following capital improvements, as determined by the City:

- o Herndon Place/Benjamin Holt Drive The City should signalize this intersection.
- o Morgan Place/Swain Road The City should provide a four-way stop at this intersection.
- o Pershing Avenue/Swain Road The City should add an exclusive right-turn lane to the eastbound approach to this intersection.
- o Brookside Road/March Lane The City should signalize the intersection and provide dual left-turn lanes and a shared rightturn/through lane on the southbound approach; a free right-turn,

left-turn, and through lane on the westbound and northbound approaches; and left-turn lane and shared through/right-turn lane on the eastbound approach.

- o Feather River Drive/March Lane The City should add a through lane to the westbound and eastbound approaches and change the northbound approach to a shared left-turn/through lane and one exclusive right-turn lane at this intersection.
- o I-5 Southbound Ramps/March Lane The City should add a through lane to the westbound and eastbound approaches and add a west-bound departure lane to permit free right-turns from the southbound approach of the intersection.
- o I-5 Northbound Ramps/March Lane The City should add a left-turn lane and a through lane to the eastbound approach, a through lane to the westbound approach, and a left-turn lane to the northbound approach to the intersection.
- o Quail Lakes Drive/March Lane The City should add a left-turn lane to the eastbound approach to this intersection.
- o Pershing Avenue/March Lane The City should replace the west-bound and eastbound right-turn lanes with shared through/right-turn lanes, add a left-turn lane to the westbound approach, add left-turn lanes to the eastbound and northbound approaches, and add an exclusive northbound right-turn lane to the intersection.
- o Pacific Avenue/March Lane The City should add a left-turn lane to each of the northbound, southbound, and westbound approaches; replace the eastbound right-turn lane with a shared through-right-turn lane; and add an exclusive right-turn lane to the northbound approach to this intersection.
- o Feather River Drive/Brookside Road The City should provide a three-way-stop-controlled intersection at this location.
- o Pershing Avenue/Brookside Road The City should add a left-turn lane to the northbound approach to this intersection.

The mitigation measures listed above would reduce the impact to a less-than-significant level.

Daily Critical Roadway Segment Analysis. Table F-12 shows the LOS along critical roadway segments in the project vicinity under the Existing Plus Approved Development Scenarios with and without the project. With or without the Brookside project, the following nine critical roadway segments would deteriorate to LOS E or F.

- o Pershing Avenue from March Lane to Rosemarie Lane,
- o Benjamin Holt Drive from Pershing Avenue to Pacific Avenue,

Table F-12. Projected Daily Travel Demand and LOS for the Existing Plus Approved Development Scenarios

	Without M		a Developiii	ent Without Brookside With Mitigation	Existing Plus Approved Development with Bit Without Mitigation With Mit				
Location	Daily Demand	V/C	LOS	V/C LOS	Daily Demand		Los	V/C Los	
nterstate 5				•					
lammer Ln. to Benjamin Holt Dr.	51,400	0.43	Α	None required	53,700	0.45	Α	None require	
Benjamin Holt Dr. to March Ln.	59,500	0.50	Α	None required	64,500	0.54	Α	None require	
March Ln. to Del Rio Dr.	65,500	0.55	Α	None required	74,000	0.62	В	None require	
el Rio Dr. to Country Club Blvd.	54,500	0.45	A	None required	63,000	0.53	A	None require	
acific Avenue							_		
ouglas Rd. to Porter Ave.	35,600	0.79	C	None required	35,600	0.79	С	None require	
ongview Ave. to Robinhood Dr.	37,400	0.83	D	None required	37,100	0.82	D	None require	
Rivara Rd. to Edan Ave.	32,900	0.73	С	None required	33,200	0.74	С	None require	
Robinhood Dr. to Yokuts Ave.	32,800	0.73	С	None required	31,800	0.71	С	None require	
okuts Ave. to March Lane	29,400	0.65	В	None required	29,100	0.65	В	None require	
Pershing Avenue	<b>a</b> a <b>a</b> aa		<b>A</b>	Name of the second	40 700				
eadow Ave. to Lincoln Rd.	16,200	0.54	A	None required	16,500	0.55	Ą	None require	
ameron Way to Benjamin Holt Dr.	16,200	0.54	A	None required	16,600	0.55	A	None require	
ouglas Rd. to Swain Rd.	22,100	0.74	Č	None required	22,600	0.75	C	None require	
enetian Dr. to March Lane	25,600	0.85	D	None required	26,200	0.87	D	None require	
arch Ln. to Rosemarie Lane	27,400	0.91	E	0.61 B	27,300	0.91	E	0.61 B	
osemarie Ln. to Brookside Lane	25,700	0.86	D	None required	26,900	0.90	D	None require	
enjamin Holt Drive			_				_		
erndon Pl. to Grigsby Pl.	19,500	0.65	В	None required	19,800	0.66	В	None require	
lymouth Rd. to Belmont Pl.	16,900	0.56	A	None required	17,200	0.57	Α	None require	
ershing Ave. to Pacific Ave.	14,500	0.97	E	0.48 A	15,000	1.00	E	0.50 A	
arrisburg to Pershing Ave.	15,600	1.04	F	0.52 A	15,900	1.06	F	0.53 A	
larch Lane	44.000	0 110		Name manufaced	no coo		_		
eather River Dr. to 1-5	11,900	0.40	Ā	None required	40,600	1.35	F	0.90 D	
-5 to Quail Lakes Dr.	42,600	1.42	F	0.71 C	50,900	1.70	F	0.85 D	
uail Lakes Dr. to Grouse Run Dr.	29,900	1.00	E	0.66 B	37,700	1.26	F	0.84 D	
rouse Run Dr. to Pershing Ave.	31,800	1.06	F	0.71 C	35,800	1.19	F	0.86 D	
ershing Ave. to Pacific Ave.	30,100	1.00	E	0.67 B	35,500	1.18	F	0.79 C	
acific Ave. to Claremont Ave.	30,700	1.02	F	0.68 B	33,700	1.12	F	0.75 C	
laremont Ave. to El Dorado St.	27,600	0.92	E	0.61 B	30,600	1.02	F	0.68- B	
wain Road		A 4=		Mana panulasa	7 000	0			
organ Pl. to Plymouth Rd.	6,800	0.45	A	None required	7,800	0.52	A	None require	
xit St. to Pershing Ave.	8,900	0.59	A	None required	9,800	0.65	В	None require	
ershing Ave. to Pacific Ave.	9,000	0.60	A	None required	9,200	0.61	В	None require	
acific Ave. to El Dorado St.	10,300	0.69	В	None required	10,400	0.69	В	None require	
uail Lakes Drive	14,200	0.47	A	None required	14,500	0.48	A	None require	
ox Sparrow Ct. to Sandpiper Ct. allard Creek Cir. to Round Valley	11,500	0.38	Â	None required	11,900	0.40	Â	None require	
rookside Road									
eather River Drive to McGaw St.	2,300	0.15	Α	None required	8,700	0.58	Α	None require	
cGaw St. to Pershing Ave.	5,900	0.39	Ä	None required	12,100	0.81	D	None require	
ershing Ave. to Pacific Ave.	6,200	0.41	Â	None required	7,200	0.48	Ā	None require	
cisining Area to racing Area	-,		-				•	equil e	

Ψ

ar icit lab

- o Benjamin Holt Drive from Harrisburg Place to Pershing Avenue,
- o March Lane from I-5 to Quail Lakes Drive,
- o March Lane from Quail Lakes Drive to Grouse Run Drive,
- o March Lane from Grouse Run Drive to Pershing Avenue,
- o March Lane from Pershing Avenue to Pacific Avenue,
- o March Lane from Pacific Avenue to Claremont Avenue, and
- o March Lane from Claremont Avenue to El Dorado Street.

This is considered a significant adverse impact.

Mitigation Measures. The applicant and successors in interest should be required to pay a pro rata share of the costs of the following capital improvements, as determined by the City:

- o Pershing Avenue Widen to six lanes from March Lane to Rosemarie Lane.
- o Benjamin Holt Drive Widen to four lanes from Harrisburg Place to Pacific Avenue.
- o March Lane Widen to six lanes from I-5 to El Dorado Street under the Existing Plus Approved Development scenario without the project. Widen to six lanes from Feather River Drive to El Dorado Street under the Existing Plus Approved Development scenario with the Brookside project.

The above-listed mitigation measures would reduce the impact to a less-than-significant level, with the exception of the segment of March Lane between I-5 and Quail Lakes Drive.

Impacts along the portion of March Lane between I-5 and Quail Lakes Drive would only be reduced to a less-than-significant level if the segment were widened to eight lanes. However, since that would not be feasible within existing rights-of-way, a partial alleviation of the impact would occur with the recommended widening to six lanes. This is considered an unavoidable adverse impact.

Peak-Hour Freeway Ramp Analysis. Table F-13 shows the I-5 ramps LOS that would result from the Existing Plus Approved Development conditions. Without the proposed project, only the southbound I-5 on-ramp at Benjamin Holt Drive would experience unacceptable LOS F. This is considered a significant adverse impact. The following mitigation measures would reduce the impact to a less-than-significant level.

Table F-13. I-5 Ramp Levels-of-Service for the Existing Plus Approved Development Scenarios

		Without N			ithout Brookside With Mitiga	tion	kisting Plus / Without M	itigation		With Mitigation
		AM		PM	AM PM		AM		PM	AM PM
Location	LOS	VOL	LOS	VOL	LOS LOS	LOS	VOL	LOS	VOL	LOS LOS
enjamin Holt Drive:										
Southbound Off	В	182	В	389	None required	В	194	В	423	None required
Southbound On	F	1,568	В	613	D À	F	1,698	В	655	D Å
Northbound Off	С	557	D	1,466	None required	С	800	E	1,641	в с
Northbound On	Α	200	Α	305	None required	Α	202	В	300	None required
arch Lane:										
Southbound Off	С	1,091	С	704	None required	D	1,263	С	1,019	None required
Southbound On	D	736	C C	1,091	None required	F	1,320	E	1,662	D C
Northbound Off	С	981	D	1,154	None required	D	1,332	F	1,673	в с
Northbound On	В	364	С	858	None required	В	510	С	978	None required
yde/Plymouth:										
Southbound Off	С	460	С	583	None required	<b>D</b> .	560	С	633	None required
Northbound On	č	490	C C	654	None required	c	590	Ď	704	None required

#### Mitigation Measures

The applicant and successors in interest should be required to pay their fair share of the cost of the following capital improvements, as determined by the City:

- o A two-lane on-ramp at this location.
- o Ramp and mainline improvements as identified in the project study report (PSR) for the March Lane/I-5 and the Plymouth-Ryde/I-5 ramp improvements/relocation.

With the proposed project, operations at the following four freeway ramps would deteriorate to an unacceptable LOS.

- o Benjamin Holt Drive southbound on-ramp
- o Benjamin Holt Drive northbound off-ramp
- o March Lane southbound on-ramp
- o March Lane northbound off-ramp

This is considered a significant adverse impact. The following mitigation measures would reduce the impact to a less-than-significant level.

#### Mitigation Measures

Successors in interest should be required to pay their fair share of the cost of the following capital improvements, as determined by the City:

- o Provide two-lane ramps at each of the four above-listed freeway ramps on 1-5.
- o Ramp and mainline improvements as identified in the PSR for the March Lane/I-5 and the Plymouth-Ryde/I-5 ramp improvements/relocation.

### Cumulative Impacts and Mitigation Measures

## Impact: Deterioration of Traffic Conditions Under Cumulative Development Scenarios

Peak Hour Intersection Analysis. The a.m. and p.m. peak-hour traffic volumes estimated for the Cumulative Development land use conditions are shown in Figures F-6 and F-7. The resulting levels of service for the critical intersections under these conditions are presented with and without mitigation in Table F-14.

Under the Cumulative Development without Brookside alternative, the following five intersections would operate at LOS E or F during either the a.m. or p.m. peak-hour.

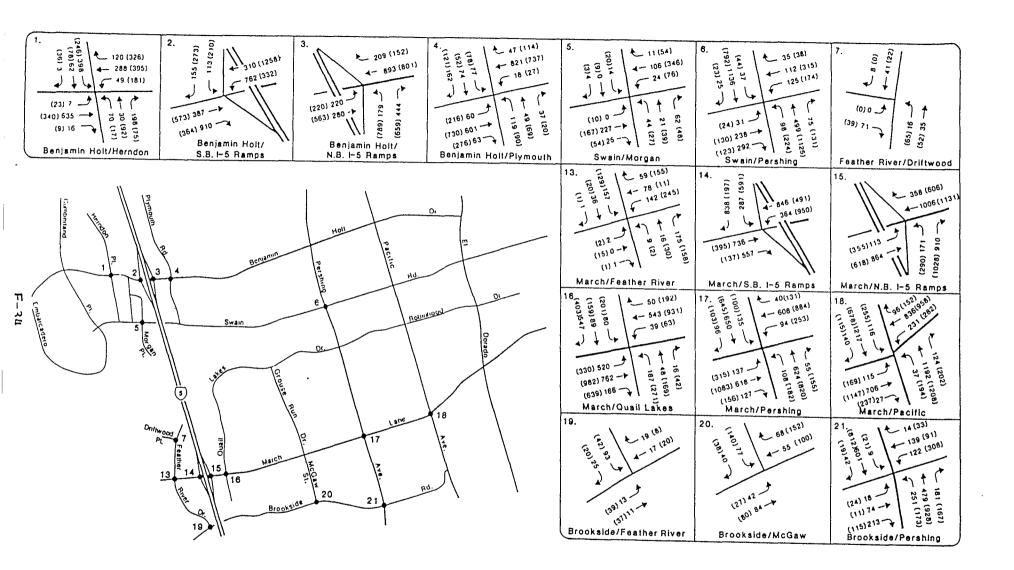
Table F-14. Intersection Levels of Service for the Cumulative Development Scenarios With and Without Mitigation

					nt Witho								oment W			
		Vithout N	Aitigatioi P			With Mit M		M		thout M		M -			tigation	n PM
Intersection	<u>∇/C</u>	LOS	V/C	LOS	V/C	Los		Los	<u>⊽/c</u>	LOS	<del>⊽/c'</del>	LOS		Los		LOS
Herndon Place/Benjamin Holt Drive <sup>a</sup>	0.73	D	0.92	E	0.71	С	0.79	С	0.75	D	0.93	E	0.73	С	0.81	D
I-5 SB ramps/Benjamin Holt Drive	0.78	D	0.52	Α	None	require	d		0.83	D	0.56	A	None	requi	red	
I-5 NB ramps/Benjamin Holt Drive	0.53	Α	0.71	С	None	require	d		0.61	В	0.79	С	None	requi	red	
Plymouth Road/Benjamin Holt Drive	0.82	D	0.87	D	None	require	d		0.89	D	0.94	E	0.87	D	0.86	D
Morgan Place/Swain Road	n.a.	A/B	n.a.	B/D	None	require	d		n.a.	C/E	n.a.	D/E	0.50	Α .	0.80	D
Pershing Avenue/Swain Road	0.97	E	0.80	С	0.76	С	0.71	С	1.04	F	0.89	D	0.82	D	0.85	D
Feather River Drive/Driftwood Place	n.a.	A/A	n.a.	A/A	None	require	d		n.a.	C/D	n.a.	B/E	None	requir	ed	
East Brookside Road/Driftwood Place	Does	not exist	t		None	require	d		n.a.	B/C	n.a.	C/E	None	requir	ed	
West Brookside Road/March Lane	Does	not exist	ŧ		None	require	ed		n.a.	B/C	n.a.	A/B	None	requir	ed	
0 Club House/March Lane	Does	not exist	t		None	require	d		n.a.	A/B	n.a.	A/A	None	requir	ed	
1 Brookside Road/March Lane <sup>a</sup>	Does	not exist	t		None	require	έġ		n.a.	D/E	n.a.	D/E	0.87	D	0.79	С
2 Brookside Road/South Loops	Does	not exist	t		None	require	ed		n.a.	B/C.	n.a.	B/D	None	requir	ed	
3 Feather River Drive/March lane	0.36	Α	0.41	A	None	require	d		1.07	F	1.20	F	0.77	С	0.84	D
4 1-5 SB ramps/March Lane	0.91	E	0.68	В	0.51	Α	0.68	В	1.27	F	1.02	F	0.88	В	0.85	D
5 1-5 NB ramps/March Lane	0.55	Α	0.85	D	None	require	ed		1.20	F	1.53	F	0.70	В	0.86	D
6 Quail Lakes Drive/March Lane	0.72	С	0.89	D	None	require	ed		0.99	E	1.12	F	0.67	В	0.80	С
7 Pershing Avenue/March Lane	0.67	В	1.00	E	0.62	В	0.89	D	0.88	D	1.20	F	0.47	Α	0.86	D
8 Pacific Avenue/March Lane	0.83	D	1.15	F	0.72	С	0.86	D	0.85	D	1.15	F	0.65	В	0.82	D
9 Feather River Drive/Brookside Road <sup>a</sup>	n.a.	A/A	n.a.	A/A	None	require	eđ		n.a.	B/E	n.a.	B/E	0.43	Α	0.53	Α
0 McGaw Street/Brookside Road	n.a.	A/A	n.a.	A/B	None	require	ed .		n.a.	C/D	n.a.	D/E	None	requir	ed	
1 Pershing Avenue/Brookside Road	0.61	В	0.73	С	None	require	ed		0.82	D	1.09	F	0.63	В	0.89	D

Notes: n.a. = not applicable

-/- = overall LOS/worst-movement LOS

Meets peak-hour volume warrants for signialization based on MUTCD criteria



Source: OMNI-MEANS 1988

A.M. AND (P.M.) PEAK HOUR VOLUMES CUMULATIVE WITHOUT BROOKSIDE

FIGURE F-6



<i></i>			
(102) 102 (125) 102 (125) 102 (127) 1117 (197) 117 (197) 117 (	29 (74) AN H H H C(201) 77 A C C C C C C C C C C C C C C C C C	(103) 148 - 1 (1	(JZ)
(36) 35 (38) 38 (38) 3	133 (203) (2	(51) 454 (52) 452 (52) 52 (4 (4 (4 (52)) 52 (4 (4 (52)) 52 (4 (4 (52)) 52 (4 (4 (52)) 52 (	
(842) 122 (108) (9 (38) 36	0.0 (239)  100 (103)	(2a) 176 - Carlor (1a) 228 - Carlor (1a) 228 - Carlor (1a) 228 - Carlor (1a) 228 - Carlor (1a) 238 - C	VOLUMES OKSIDE
75 (114) 115 (114) 116 (114) 117 (114) 1	Dorado	(1390) OH OF STATE OF	D (P.M.) PEAK HOUR VOLUMES IULATIVE WITH BROOKSIDE
4. (25) 55 (35) 14 (25) 15 (25) 16 (25) 17 (25) 18 (31) 19	Ba (139).	(1867) 7/ Pershing	A.M. AND (P.M.) CUMULATIV
3. (708)38 (378) (708)38 (708)	Crowse and Or McCast.	(38) (185) 191 (2) (2) (190) (190) (190) (190)	A.h
(23) 7 (348) 466 (374) 837	Modost Language State of the st	OMNI-MEANS 1988	
(36) 14 (36) 20 (36) 14 (36) 1	Cuniberland P. F-35	Source: OM	43

- o Herndon Place/Benjamin Holt Drive
- o Pershing Avenue/Swain Road
- o 1-5 Southbound Ramps/March Lane
- o Pershing Avenue/March Lane
- o Pacific Avenue/March Lane

This is considered a significant adverse impact.

#### Mitigation Measures

Successors in interest should be required to pay a pro rata share of the costs of the following capital improvements, as determined by the City:

- o Herndon Place/Benjamin Holt Drive The City should install a signal at this intersection.
- o Pershing Avenue/Swain Road The City should add an exclusive right-turn lane to the eastbound approach to this intersection.
- o I-5 Southbound Ramps/March Lane The City should add a west-bound departure lane to permit free southbound right turns at this intersection.
- o Pershing Avenue/March Lane The City should add a right-turn lane to the northbound approach and a left-turn lane to the east-bound and westbound approaches to this intersection.
- o Pacific Avenue/March Lane The City should add a left-turn lane to southbound and westbound approaches, replace the eastbound right-turn lane with a shared through/right-turn lane, and add an exclusive right-turn lane to the northbound approach to this intersection.

The above-listed mitigation measures would reduce the impact to a less-than-significant level.

Under the Cumulative Development with Brookside alternative 13 critical intersections would experience LOS E or F during the a.m. or p.m. peak-hour, and two unsignalized intersections would require improvement. The following intersections would be impacted.

- o Herndon Place/Benjamin Holt Drive
- o Plymouth Avenue/Benjamin Holt Drive
- o Morgan Place/Swain Road
- o Pershing Avenue/Swain Road
- o Brookside Road/March Lane

- o Feather River Drive/March Lane
- o 1-5 Southbound Ramps/March Lane
- o I-5 Northbound Ramps/March Lane
- o Quail Lakes Drive/March Lane
- o Pershing Avenue/March Lane
- o Pacific Avenue/March Lane
- o Feather River Drive/Brookside Road
- o Pershing Avenue/Brookside Road

This is considered a significant adverse impact.

#### Mitigation Measures

The applicant and successors in interest should be required to pay a pro rata share of the costs of the following capital improvements, as determined by the City.

- o Herndon Place/Benjamin Holt Drive The City should signalize this intersection.
- o Plymouth Avenue/Benjamin Holt Drive The City should add an exclusive left-turn lane to the eastbound approach to this intersection.
- o Morgan Place/Swain Road The City should provide a four-way stop at this intersection.
- o Pershing Avenue/Swain Road The City should add an exclusive right-turn lane to the eastbound approach to this intersection.
- o Brookside Road/March Lane The City should signalize the intersection and provide dual left-turn lanes and a shared right-turn/through lane on the southbound approach; a free right-turn, left-turn, and through lane on the westbound and northbound approaches; and left-turn lane and shared through/right-turn lane on the eastbound approach.
- o Feather River Drive/March Lane The City should add a through lane to the westbound and eastbound approaches and change the northbound approach to a shared left-turn/through lane and one exclusive right-turn lane at this intersection.
- o I-5 Southbound Ramps/March Lane The City should add a through lane to the westbound and eastbound approaches and add a west-bound departure lane to permit free right turns from the southbound approach of the intersection.

- o 1-5 Northbound Ramps/March Lane The City should add a through lane to the westbound approach, a left-turn lane to the northbound approach, and a through lane and a left-turn lane to the eastbound approach to this intersection.
- o Quail Lakes Drive/March Lane The City should add a through lane and a left-turn lane to the eastbound approach and a through lane to the westbound approach to this intersection.
- o Pershing Avenue/March Lane The City should add a through lane to the westbound approach, add a left-turn lane and a through lane each to the eastbound and northbound approaches, and add a south-bound through lane to the intersection.
- o Pacific Avenue/March Lane The City should add a through lane to each the northbound, southbound, eastbound and westbound approaches; replace the eastbound right-turn lane with a shared through-right-turn lane; and add an exclusive left-turn lane to the eastbound approach to this intersection.
- o Feather River Drive/Brookside Road The City should signalize this intersection.
- o Pershing Avenue/Brookside Road The City should add a left-turn lane to each the northbound and westbound approaches to this intersection.

The above listed mitigation measures would reduce the impact to a less-than-significant level.

Daily Critical Roadway Segment Analysis Table F-15 shows the LOS along critical roadway segments in the project vicinity under the Cumulative Development Scenarios with and without the project. The following nine critical roadway segments would deteriorate to LOS E or F with or without the Brookside project, except for March Lane from Feather River Drive to I-5, which would still operate at an acceptable LOS under the Cumulative without Brookside scenario.

- o Benjamin Holt Drive from Pershing Avenue to Pacific Avenue
- o Benjamin Holt Drive from Harrisburg Place to Pershing Avenue
- o March Lane from Feather River Drive to I-5
- o March Lane from I-5 to Quail Lakes Drive
- o March Lane from Quail Lakes Drive to Grouse Run Drive
- o March Lane from Grouse Run Drive to Pershing Avenue
- o March Lane from Pershing Avenue to Pacific Avenue
- o March Lane from Pacific Avenue to Claremont Avenue

Table F-15. Projected Daily Travel Demand and LOS for the Cumulative Development Scenarios

			elopment W	ithout Brookside		pment Wi	th Brookside	
Location	Without M Daily Demand	itigation V/C	Los	With Mitigation V/C LOS	Without M Daily Demand		Los	With Mitigation V/C LOS
nterstate 5				······································				·
lammer Ln. to Benjamin Holt Dr.	67,600	0.56	Α	None required	73,000	0.61	В	None required
Benjamin Holt Dr. to March Ln.	69,300	0.58	Α	None required	75,400	0.63	В	None required
March Ln. to Del Rio Dr.	78,300	0.65	В	None required	86,600	0.72	С	None required
el Rio Dr. to Country Club Blvd.	67,300	0.56	A	None required	75,300		В	None required
acific Avenue								
ouglas Rd. to Porter Ave.	36,900	0.82	D	None required	36,000		С	None required
ongview Ave. to Robinhood Dr.	37,900	0.84	D	None required	36,900		D	None required
obinhood Dr. to Yokuts Ave.	33,300	0.74	Ç	None required	32,100		С	None required
okuts Ave. to March Lane	29,300	0.65	В	None required	30,200	0.67	В	None required
Pershing Avenue	16 200	0 52	٨	None manutura	17 200	0 57	<b>A</b>	Name assessions
eadow Ave. to Lincoln Rd.	16,200	0.54	A	None required	17,200		A	None required
ameron Way to Benjamin Holt Dr.	15,600	0.52	A B	None required None required	17,300		A C	None required
ouglas Rd, to Swain Rd.	20,200	0.67	Č		22,900		D	None required
enetian Dr. to March Lane	23,900	0.80	D C	None required	26,500		-	None required
arch Ln. to Rosemarie Lane	25,400	0.85	D	None required	26,600	- • • •	D D	None required
osemarie Ln. to Brookside Lane	26,400	0.88	U	None required	27,000	0.90	ט	None required
enjamin Holt Drive erdon Pl. to Grigsby Pl.	17,100	0.57	A	None required	17,200	0.57	A	None required
lymouth Rd. to Belmont Pl.	16,700	0.56	Â	None required	18,500		В	None required
ershing Ave. to Pacific Ave.	13,700	0.91	Ë	0.46 Å	14,300		Ē	0.48 A
arrisburg to Pershing Ave.	14,500	0.97	Ē	0.48 A	15,100		F	0.50 A
larch Lane								
eather River to 1-5	14,000	0.47	Α	None required	47,000	1.57	F	0.78 C
-5 to Quail Lakes Dr.	46,800	1.56	F	0.78 Č	55,700	1.86	F	0.93 E
uail Lakes Dr. to Grouse Run Dr.	33,700	1.12	F	0.75 C	40,700	1.36	F	0.90 D
rouse Run Dr. to Pershing Ave.	34,600	1.15	F	0.77 C	40,800	1.36	F	0.90 D
ershing Ave. to Pacific Ave.	33,400	1.11	F	0.74 C	37,600	1.25	F	0.84 D
acific Ave. to Claremont Ave.	35,300	1.18	F	0.78 C	37,900	1.26	F	0.84 D
laremont Ave. to El Dorado St.	32,700	1.09	F	0.73 C	35,300	1.18	F	0.78 C
wain Road				Maria de la compansión de				
organ Pl. to Plymouth Rd.	7,000	0.47	A	None required	8,000		A	None required
xit St. to Pershing Ave.	9,000	0.60	A	None required	9,900	- • • -	В	None required
ershing Ave. to Pacific Ave.	9,200	0.61	В	None required	9,500		В	None required
acific Ave. to El Dorado St.	10,500	0.70	В	None required	10,600	0.71	С	None required
uail Lakes Drive	12 600	0.42	A	None required	15,100	0.50	A	None manufacture
ox Sparrow Ct. to Sandpiper Ct. allard Creek Cir. to Round Valley	12,600 11,600	0.39	Â	None required	12,200		D	None required None required
rookside Road								
eather River Drive to McGaw St.	2,400	0.16	Α	None required	8,000	0.59	A	None required
cGaw St. to Pershing Ave.	6,200	0.41	Ä	None required	12,400		D	None required
• • • • • • • • • • • • • • • • • • • •	6,400	0.43	Ā	None required	7,400		Ā	None required
Pershing Ave. to Pacific Ave.	6,400	V.43	^	None required	7,400	U.45	^	None requ

o March Lane from Claremont Avenue to El Dorado Street

This is considered a significant adverse impact.

<u>Mitigation Measures</u>. The applicant and successors in interest should be required to pay a pro rata share of the costs of the following capital improvements, as determined by the City:

- o Benjamin Holt Drive Widen to four lanes from Harrisburg Place to Pacific Avenue.
- o March Lane Widen to six lanes from I-5 to El Dorado Street under the Cumulative Development scenario without the project. Widen to six lanes from Feather River Drive to El Dorado Street under the Cumulative Development scenario with the Brookside project.

The above-listed mitigation measures would reduce the impact to a less-than-significant level, except for the portion of March Lane between Feather River Drive and Quail Lakes Drive, which would only be reduced to a less-than-significant level if the segment were widened to eight lanes. However, since that would not be feasible within existing rights-of-way, a partial alleviation of the impact would occur with the recommended widening to six lanes. This is considered an unavoidable adverse impact.

Peak-Hour Freeway Ramp Analysis. Table F-16 shows the I-5 ramps LOS that would result from the Cumulative Development conditions. Without the Brookside project, conditions at the following four ramps would deteriorate to LOS E or F.

- o Benjamin Holt Drive southbound on-ramp
- o Benjamin Holt Drive northbound off-ramp
- o March Lane southbound on-ramp
- o March Lane northbound off-ramp

This is considered a significant adverse impact. With the exception of the recommended improvements for the Benjamin Holt Drive southbound on-ramp, the following mitigation measure would reduce the impact to a less-than-significant level.

#### Mitigation Measures

Successors in interest should be required to pay their fair share of the cost of the following capital improvements, as determined by the City:

o Provide two-lane ramps at each of the four above-listed ramps on I-5. LOS would only be improved to E during the a.m. at the southbound on-ramp from Benjamin Holt Drive.

Table F-16. I-5 Ramp Levels of Service for the Cumulative Development Scenarios

Location			e Develop Mitigation		t Brookside With Mitigation	Cumulative Development With Brookside Without Mitigation With Mitigation						
		AM	P	M AM PM			M	agation	PM	With Mitigation PM AM PM		
	Los	VOL	LOS	VOL	LOS LOS	LOS	VOL	LOS	VOL	LÖS	LOS	
Benjamin Holt Drive:												
Southbound Off	C F	268	С	483	None required	С	291	С	528	None	require	
Southbound On	F	1,672	B E	696	Е В	F	1,789	C E C	740	F	В	
Northbound Off	С	623	E	1,448	в с	C C	783	Ε	1,623	В	С	
Northbound On	С	429	С	372	None required	С	444	С	397	None	required	
March Lane:									•			
Southbound Off	D	1,125	С	788	None required	E	1,293	D	1,122	С	В	
Southbound On	Ε	921	E	1,087	D C	E F E	1,376	F	1,690	E	D C C	
Northbound Off	D	1,081	E	1,318	в с		1,463	F	1,846	В	С	
Northbound On	С	471	D	961	None required	С	684	E	1,129	Α	С	
Ryde/Plymouth Road												
Southbound Off	D C	490	С	619	None required	D	590	D	669	None	required	
Northbound On	С	526	D	686	None required	D	616	E	726	В	D	

Ramp and mainline improvements as identified in the PSR for the March Lane/I-5 and the Plymouth-Ryde/I-5 ramp improvements/relocation.

Impacts at the Benjamin Holt Drive southbound on-ramp are considered adverse and unavoidable under the Cumulative Development condition without the proposed project. Implementation of the No-Project Alternative would reduce the impact to a less-than-significant level.

With the proposed project, operations at the following seven freeway ramps would deteriorate to an unacceptable LOS.

- o Benjamin Holt Drive southbound on-ramp
- o Benjamin Holt Drive northbound off-ramp
- o March Lane southbound off-ramp
- o March Lane southbound on-ramp
- o March Lane northbound off-ramp
- o March Lane northbound on-ramp
- o Ryde/Plymouth northbound on-ramp

This is considered a significant adverse impact. With the exception of the recommended improvements for the Benjamin Holt Drive and March Lane southbound on-ramps, the following mitigation measures would reduce the impact to a less-than-significant level.

#### Mitigation Measures

The applicant and successors in interest should be required to pay for their fair share of the cost of the following capital improvements, as determined by the City.

- o Caltrans and the City should provide two-lane on-ramps at each of the seven above-listed ramps on I-5. LOS would only be improved to F and E at the Benjamin Holt Drive southbound on-ramp and the March Lane southbound on-ramp, respectively, during the a.m. peak-hour.
- o Ramp and mainline improvements as identified in the PSR for the March Lane/I-5 and the Plymouth-Ryde/I-5 ramp improvements/relocation.

Impacts at the Benjamin Holt Drive southbound on-ramp and the March Lane southbound on-ramp are considered adverse and unavoidable under the Cumulative Development condition with the Brookside project. Implementation of the No-Project Alternative would reduce the impact to a less-than-significant level.

#### Other Mitigation Measures

#### Transportation Systems Management

The vehicle trips traffic analysis was not reduced to account for implementation of transportation systems management TSM programs. If, however, an effective TSM program were to be implemented, daily and peak-hour trips could be reduced from 5 to 30 percent, with proportionate improvements in LOS at certain critical intersections.

Presently, the City of Stockton does not have a TSM ordinance. It is recommended that the City adopt such an ordinance as a broad traffic mitigation measure to reduce the numbers of single passenger vehicle commuters from existing and future employment centers.

As identified in the project description, the proposed Brookside Community is a mixed-use development comprising both residential and employment land uses. The measures described in the following sections include recommendations for employment-intensive and residential land uses.

TSM Coordinator. Coordination of alternative modes of transportation can be achieved through the employment or appointment of a full-time TSM coordinator. The coordinator is responsible for developing the program, gaining management support, marketing the program before fellow employees, and maintaining and evaluating its progress. Some companies choose to hire a consultant to assess a particular firm's situation with a view to developing an overall transportation program, followed by assignment of a coordinator to see to its implementation.

Carpools and Vanpools. These forms of ridesharing can reduce commute costs, energy consumption per passenger, highway congestion, parking demand, and air pollution. Other benefits of ridesharing include improved employee morale, reduced absenteeism and tardiness, and lower capital costs for employee parking. The employer saves by reducing the need for parking if more employees rideshare. The company or organization can provide incentives for ridesharing by setting aside preferential parking spaces or providing reduced parking rates to carpoolers and vanpoolers. For each vanpool formed, a company can remove at least six vehicles from its parking facility. For each three-person carpool formed, a reduction of at least two spaces can be achieved.

<u>Public Transit</u>. The TSM coordinator provides schedules and other transit route information to employees and encourages office tenants to schedule employee hours around those schedules. As more fringe areas develop in Stockton, the existing transit system should be expanded to support the new development.

Some advantages to the transit commuter include no parking costs; no parking availability problems; no expensive vehicle maintenance costs; and, in areas where parking is difficult to find, commuting by transit is as fast or faster than driving.

Cycling and Walking. For employees who live within a few miles of work, bicycling and walking can be important elements of a company's transportation program. Bicycling is most attractive to employees who live within 5 miles of work, and walking is more popular among employees who live within 1 mile of the work site.

A company or organization can encourage bicycle commuting by offering appropriate facilities and incentives, and by marketing the program. Bicycle commuting can be promoted by providing bicycle parking spaces, as well as shower and locker facilities. Providing a secure place for bicycles to ensure protection against weather and theft is very important.

Park and Ride Lots. To encourage ridesharing, park and ride lots should be developed in the vicinity of major intersections. Bus stops should be located adjacent to these streets. Appropriate locations for park and ride lots in Stockton are near interchanges along I-5 and SR 99.

Parking Management. The availability, accessibility, and cost of parking are factors in determining the mode of transportation a person takes to work. Employers can encourage ridesharing, with a parking management plan that would include such elements as preferential parking locations and reduced fees.

Alternate Work Hours. Spreading the demand for travel over time is a way to make more efficient use of transportation facilities and equipment. Staggered hours and flextime are two types of work hour plans.

Staggered hours are scheduled by assignment, with various work groups beginning work at different times. Spacing arrivals and departures at specified intervals before and after conventional business hours allows workers to travel at times when congested traffic conditions have eased.

Flextime is a schedule practice that allows individual employees to set their own working hours within limits established by company policy. Employees benefit from the ability to follow a schedule that suits their work, commuting, and home life habits more conveniently. Employers benefit from reduced absenteeism, reduced turnover, and increased productivity. The community also benefits from the easing of rush-hour traffic congestion that results when employees choose schedules that allow them to avoid rush-hour traffic.

Ancillary Services to Promote Site Self-Sufficiency. Ancillary services and facilities might be encouraged within a given site to facilitate the self-sufficiency of the development and reduce the total number of external trips generated by the site. Such amenities might include restaurants, banking services, limited commercial/retail uses, child care facilities, exercise facilities, and other services that promote a cohesive, self-contained environment.

TSM strategies, which have particular application to the residential development within the study area, include the items discussed below.

Home-End Transportation Coordination. The home-end equivalent of the workplace transportation coordinator can be implemented in several ways.

The worksite coordinators in the general area could perform home-end coordination and trip planning assistance as a community service, or residential property owner associations might serve as promotional and coordinating agents. Larger multifamily developments might want to include some elements of trip planning information as part of their property management services. This sort of function could also be a responsibility of the County, done in conjunction with promoting and planning nonresidential TSM strategies.

Bicycle and Walking Facilities. Providing extensive and well-planned pedestrian pathways and bikeways within the study area is a good way to connect residential areas with shopping and employment areas in and adjacent to the study area. When coupled with employer measures to promote bicycling and walking at the workplace, home-end measures will further facilitate the use of these nonauto modes.

Shuttle Services. Large multifamily residential developments, commercial developments, churches, and other community groups might work cooperatively to implement local shuttle bus service to nearby locations or shopping and personal services within and adjacent to the study area.

<u>Community Awareness Efforts.</u> Welcome wagon efforts and community service groups can be effective in the distribution of information and increasing awareness of transportation alternatives for study area residents.

#### Urban Interchange

As a part of the mitigation measures, an "Urban Interchange" was considered as a possible improvement at locations along I-5 where conventional diamond-shaped interchanges exist. The "Urban Interchange," developed through Greiner Engineering Sciences research efforts, eliminates many of the capacity constraints of the diamond interchange and can be constructed in a much tighter right-of-way configuration than a diamond. Since the approach highway has a much higher capacity than the intersection capacity, long-standing queues waiting for a green indication can result, causing operating conditions to drop to an unacceptable level. Another disadvantage of the conventional diamond is that each of the left-turn movements crosses the tracking path of the opposing left-turn movement twice. Motorists making U-turn movements must also cross the tracking path of the opposing left-turn movement twice.

The "Urban Interchange" design is based on inverting the left-turn movements so that the interchange operates as one intersection with large radius turns rather than two separate ramp terminals located close together. As a part of the design, directional lights embedded in the pavement, along with short skip stripes, are used to delineate the large radius left-turn paths. Figures A-1 and A-2 are presented in Appendix I to illustrate the difference between the "urban" and diamond interchanges.

A capacity comparison between the "urban interchange" and the existing diamond was studied by Greiner Engineering Services, and it was

concluded that the "urban interchange" has more than double the capacity of a conventional signalized diamond interchange, using the same section under the bridge structure and the same approach right-of-way.

The existing median strip separating the northbound and southbound travel lanes on I-5 is approximately 50 feet wide. The urban interchange design requires that the elevated structure be at a minimal width and, in most cases, a concrete median barrier is implemented to separate traffic flowing in opposite directions. Therefore, in order to construct an "urban interchange" along I-5, it would be necessary to realign the freeway segments to narrow the overall width of the facility.

To narrow the overall width of I-5 at March Lane would not only require a realignment of the existing structures over March Lane, but the bridges would also require modification across the East Bay Municipal Utility District (EBMUD) facility (south of March Lane). Such modifications may be economically infeasible.

#### Relocation of the Ryde Avenue/Plymouth Road I-5 Ramps

Another potential mitigation measure studied was the possible relocation of the Ryde Avenue/Plymouth Road I-5 ramps to Alpine Avenue. This improvement would allow mainline flows on I-5 to stabilize before exiting northbound, or after entering southbound from March Lane. In addition, weaving conflicts between vehicle movements from the Ryde Avenue/Plymouth Road interchange and March Lane interchange traffic movements would be less severe.

#### Calaveras River Crossing West of I-5

A study of the impacts of providing an additional crossing of the Calaveras River via a western extension of River Road was conducted to determine the potential for alleviation of traffic problems at the March Lane interchange. The study was conducted by OMNI-MEANS, Ltd., and is available on request at the City Community Development/Planning Division. The conclusion of the report is that under cumulative conditions, even with the Calaveras River crossing, LOS at the I-5/March Lane interchange ramps would continue to be F.